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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/036,198	12/28/2001	Chris Rich	WVFRNT.001A	2841

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EXAMINER
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ANGEBRANDT, MARTIN J

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 09/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/036,198	Applicant(s) RICH ET AL. <span style="float: right;">S.C.</span>	
	Examiner Martin J Angebrannt	Art Unit 1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 July 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-59, 99 and 109-111 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8-59, 99 and 109-111 is/are rejected.
- 7) ☒ Claim(s) 6 and 7 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                         |                                                                             |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                                |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____                                                             | 6) <input type="checkbox"/> Other: _____                                    |

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1. The response filed by the applicant has been read and given careful consideration.

Responses to the arguments of the applicant are presented after the first rejection to which they are directed. The rejections under 35 USC 101 are withdrawn in view of the declaration of H. John Caulfield. The Declarant is well known in the holographic arts and the declaration describes tests preformed and their result clearly indicating that volume holograms are formed and that these are formed in the absence of a refractive index difference between the curable material and the surface relief pattern (see sections 12,13,15,17-19). This serves to establish a basis for the functionality of the embodiment of claim 6 and similar embodiments which renders them unobvious as one skilled in the art would assume that a refractive index mismatch would be required. The section at [0042] describing the thinness addresses the issues of e-beam or corona charges as exposure means. Based upon the use of a proximity exposure by Okai 'et al., rejections based upon that reference are withdrawn.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless —

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3 The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4 Claims 1,2,4,5,8,10-12,18,24,32-34,41-48 and 99 are rejected under 35 U.S.C. 102(b) as being fully anticipated by Shirasaki et al. '442.

Shirasaki et al. '442 describes with respect to figure 25, **contacting** the phase shifted phase grating mask with a photoresist layer and exposure through the mask with an s-polarized laser to record the pattern in the resist. (17/47-57). The exposed resist before development meets the claims (see Haugh '526, describing the "elimination of such post-exposure steps as developing or fixing" to form a volume hologram on page 7 of copy submitted by the applicant/paragraph 3)

The applicant argues that a light curable material is not disclosed. The examiner points out that photoresist are light sensitive and the **contacting** of the phase shifted diffraction grating mask with the surface would inherently leave a surface pattern. The rejection is one of inherency and the applicant cannot very well argue a teaching away of exemplified subject matter. Claims 41 and 47 do not require anything beyond a surface relief diffraction pattern. As discussed above, the contacting process inherently forms a surface relief in the cured layer. The rejection stands.

The claims require at least some contribution in the volume diffractive article from the relief surface, which is not due to diffractive effects. Shirasaki et al. '442 describes a phase grating "placed **in contact** with a photoresist layer" with respect to figure 25 and exposed with linearly polarized light. The phase masks are described as being formed of quartz glass, which is transparent to UV with respect to figures 4 and 5 (9/3-53). **The express disclosure of contacting the mask with the photoresist clearly indicates that contact between the two is made.** The spacing may be for illustration purposes. The examiner notes that the instant specification describes the use of a surface relief tools, which have (UV) light pass through them [0051 and 0039-0040]. It would appear from the specification that glass would meet these

requirements, the claimed process steps are anticipated and the result would be inherent in the process. The applicant argues that Shirasaki et al. '442 does not disclose a contribution from a source other than the surface relief, but if the result is inherent to the process this is not required. The examiner notes that in the declaration of H. John Caulfield, the curable materials included LC materials. The examiner notes that the claims are broader than this, but the photoresist material of Shirasaki et al. '442 is within the curable materials limitations of the claims. The examiner notes that Haugh et al. 526 describes recording volume holographic elements in photoresist materials. If the diffractive effects only become observable after application of a field to an PDLC or LC containing material, then the claims should indicate this limitation as it would be essential. The examiner notes that LC containing holographic elements are known in the prior art of record to be switchable as evidenced by Ingwall et al. '912 and Sutherland et al. WO 01/90822. If the applicants find or assert that the glass diffractive masters, such as those disclosed by Pettigrew et al. '780 or Shirasaki et al. '442 lack the requisite functionality to meet all the process limitations, then the applicants should submit a declaration commensurate in scope with the claimed subject matter including data and completely describing the experiment evidencing the lack of functionality. The rejection stands and is applied to the other claims, previously held to be inoperable.

5        Claims 1-5,8,10-12,18,24,32-34,41-50,53 and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pettigrew et al. '780.

Pettigrew et al. '780 teaches a master diffraction grating with chromium forming the pattern contacted with a release agent and a light curing resin, where the UV light is passed

through the master first and then cures the resin as shown in figure 1b, . (2/7-30) The use of this process with a relief glass master is disclosed. (1/15-20).

It would have been obvious to one skilled in the art to modify the example of Pettigrew et al. '780 by using a glass relief master in place of the glass and chromium master based upon the disclosed to do so. The formation of the refractive index variations due to the surface contact of the glass master is held to be inherent as discussed above. Clearly in figure 1b, the contact is shown. The rejection stands and is applied to the other claims, previously held to be inoperable.

6 Claims 41-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda et al. '033, in view of Moss et al. '417.

Ikeda et al. '033 teach the formation of a master volume phase hologram by exposing a silver halide film, processing it to form an absorption hologram and then bleaching it (1/10-40). The use of proximity exposure of contact exposure through the holographic master (12) and into the photosensitive layer (14) is disclosed with respect to figure 5. (4/51-5/2 and 7/43-8/6). Example 2 uses a volume phase hologram as the master (4) and is coated with the polyvinyl carbazole photoresist layer and a reflection type exposure is used to form a phase type hologram. The term "phase hologram" in the reference described holograms with refractive index fringes formed in the photosensitive layer (3/38-40) which is the same as a volume hologram.

Moss et al. '417 teach that volume holograms have both modulation on the surface (surface relief or thin holograms) and fringes of refractive index modulation throughout the thickness (thick holograms) (2/8-54).

It would have been obvious to one skilled in the art to modify the process of figure 5 to use a phase holographic master based upon the disclosure of the use of volume phase holographic masters in example 2 and in column 1 of Ikeda et al. '033 and the master hologram would inherently have a relief pattern corresponding to the refractive index modulated fringes where they intersect the surface of the volume holographic master based upon the teachings of Moss et al. '417.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The examiner notes that the claims rejected under this heading do not exclude contributions from sources other than the surface effects. While the surface effects would clearly contribute to the diffraction, the majority would be from the interior thickness of the holographic master. The applicant argues that Moss et al. does not teach that volume holograms have surface effects (thin or phase gratings). The cited portion of the text describes exactly that. The desensitization of the interfacial region prevents high contrast fringes from being formed in that region. The exposure prevents any differential swelling due to the curing at or near the surface of the holographic recording material. The claim language does not exclude contributions from the volume (thick) holographic phase. The rejection stands.

7 Claims 1-5,8,10-12,18-24,31-34,41-53 and 99 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pettigrew et al. '780, in view of Haugh '526.

Haugh '526 teaches the previous use of silver halide and conventional resist materials such as dichromated gelatin or the like have disadvantages in that extensive post processing is required and the silver halide materials are relatively expensive. (col. 2/lines 29-65). The use of free radically polymerizable resist materials, such as acrylates, is disclosed throughout (3/22-6/25). The use of contact copying methods where the radiation passes through the master is disclosed. (6/6/57-75) The use of various light sources in making copies, including UV sources such as arc or vapor lamps is disclosed. (7/15-27). The image produced during the exposure does not require post processing (8/43-63). When contact is close (0.001 in) then resolution is not lost when using an incoherent source (7/58-69). The examples use contact copying processes, with example XXXII using a mercury lamp. The use of a non-imagewise exposure after forming the holographic image and may improve the quality of the hologram. (9/40-52).

It would have been obvious to one skilled in the art to modify the process of Pettigrew et al. '780 by using the incoherent light sources disclosed by Haugh '526 as curing holographic photopolymeric recording materials with a reasonable expectation of success. The rejection stands for the reasons above and is applied to the other claims, previously held to be inoperable.

8        Claims 1-5,8-59, 99 and 109-111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pettigrew et al. '780 and Haugh '526, in view of Ingwall et al. '912 and Sutherland et al. WO 01/90822.

Ingwall et al. '912 (discussed in Molteni et al. '853) teaches coating photopolymerizable acrylic/acrylate materials onto indium tin oxide (ITO) coated glass substrates, exposing and fixing the holograms with a UV exposure followed by filling the voids in the hologram with

liquid crystal materials (example 1, 4/6-5/55). Example 2 further coats these with an alignment layer coated on a ITO coated glass plate, which allows the application of a voltage to control the diffraction efficiency of the hologram. (5/59-6/2). The use of in-situ polymerization of compositions containing liquid crystals and polymeric precursors is disclosed as known as polymer dispersed liquid crystal materials (PDLC). (1/37-53)

Sutherland et al. WO 01/90822 teach contact exposure of PDLC materials with respect to figure 4. The master may be various hologram types including thin, volume, surface and multiplexed holograms (page 21/ line 31-page 22/line 32). Post recording processing , including exposure is disclosed. (24/3-9). Useful PDLC compositions include the LC mixture E7. (16/15-27).

In addition to the basis provided above, the examiner holds that it would have been obvious to one skilled in the art to modify the process of Pettigrew et al. '780 and Haugh '526, by using contact exposure of the master with a PDLC composition such as that disclosed by Sutherland et al. WO 01/90822 to facilitate forming a electronically variable diffraction efficiency in the holographic medium, coated in a ITO/glass plate laminate and followed by providing the exposed side with an ITO coated glass plate as taught by Ingwall et al. '912 to remove the need to fill the voids with LC material required with the compositions of Ingwall et al. '912 and to improve the degree of contact between the master and the recording material, thus allowing UV or incoherent sources to be used in the copying process as taught by Haugh '526.

The rejection stands for the reasons above and is applied to the other claims, previously held to be inoperable.

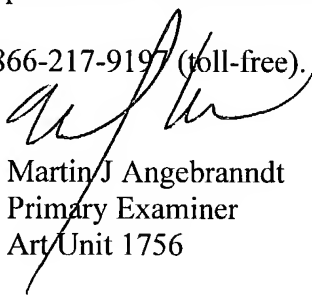
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9 Claims 6 and 7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Martin J Angebranndt  
Primary Examiner  
Art Unit 1756

09/06/2004